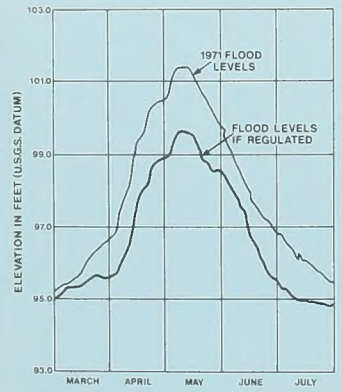
It is technically feasible to reduce flood damages further but it would mean that environmental criteria would not be met and wetland productivity would decline.

The proposed gated structure, sited about 3,000 feet downstream of the CPR bridge at St-Jean, would comprise six gates, each 100 feet long and 10 feet high, installed across the river. The gates would be separated by 14-foot concrete piers containing machinery by which they could be raised or lowered to effect control of upstream levels and river discharges. A test model was built to scale to ensure that the design is adequate and to determine the various stages of construction. A dredged channel 700 feet wide and almost two miles in length would also be needed. The capital cost of the gated structure would be $12,700,000 and the cost of dredging is estimated at $3,300,000, resulting in a total cost of about $16 million. According to accepted economic evaluation used in both countries, the benefit-cost ratio of this part of the plan is 1.8. However, the recommended plan also includes flood forecasting and warning, and regulation of flood plains, which increase the benefit-cost ratio to 2.0.

Seining for pike to learn their spawning habits was an important task in the environmental studies.

Public hearings on the recommended plan are scheduled for early June 1978, following which the International Joint Commission is expected to make its recommendations to the governments of Canada and the United States.



Lake Champlain flood stage showing 1971 flood levels and corresponding flood levels had the lake been regulated by the proposed gated structure at St. Jean and associated dyking and dredging.

HIGHLIGHTS OF THE STUDY AREA

- ★ The Lake Champlain-Richelieu River watershed covers a total area of 9,200 square miles in the states of New York and Vermont, and the province of Quebec.
- ★ Lake Champlain, 490 square miles in area, is the sixth largest lake in the United States, exceeded only by the Great Lakes.
- ★ Historically, the Champlain-Richelieu valley was the major north-south access route between Canada and the northeastern U.S. and, as such, played a prominent role in French-English and Canadian-American military and trade relations over the centuries.
- ★ Forty five wetlands have been identified in the system. Although these wetlands cover an area of only 52,000 acres (less than 1% of the basin's area) the role they play in determining the biological productivity of the system is vital to the natural life of the area.
- ★ The system is known to support 80 species of fish (fourteen of which are game); waterfowl, muskrat, and aquatic plant life.
- ★ Recreation is the major industry and accounts for annual revenues of $25 million.
- ★ The waterway, along with the Champlain canal which connects Lake Champlain with the Hudson River, is an important trade and recreational boating asset during the summer months.
- ★ The population of the region totalled 461,000 in 1976 and is expected to reach 781,000 by 2030.

ADDITIONAL INFORMATION

The International Champlain-Richelieu Board, which assisted the Commission in its deliberations, produced a report detailing the actions that will be necessary to reduce flood damage in the basin. A quantity of the Board's report in English and French is being made available through the Commission's offices: at 151 Slater Street, Ottawa, Canada, K1P 5H3, and at 1717 Street NW, Washington, D.C., 20440.

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Reducing flood damage in the Lake Champlain-Richelieu River Basin

During the past five years, the International Joint Commission has been investigating alternative ways of reducing flood damage on Lake Champlain and along the upper Richelieu River. In its work, the Commission has had access to professionals in the employ of state, provincial, and federal governments, universities and the private sector. Extensive field surveys were conducted in both countries to determine the environmental, physical, and economic effects of water level regulation. The total cost of the investigations, $2.6 million, was shared equally between the United States and Canada.

During the study, many meetings were held at which the public exchanged views with study personnel and expressed concern either with the flooding problem or with possible environmental deterioration.

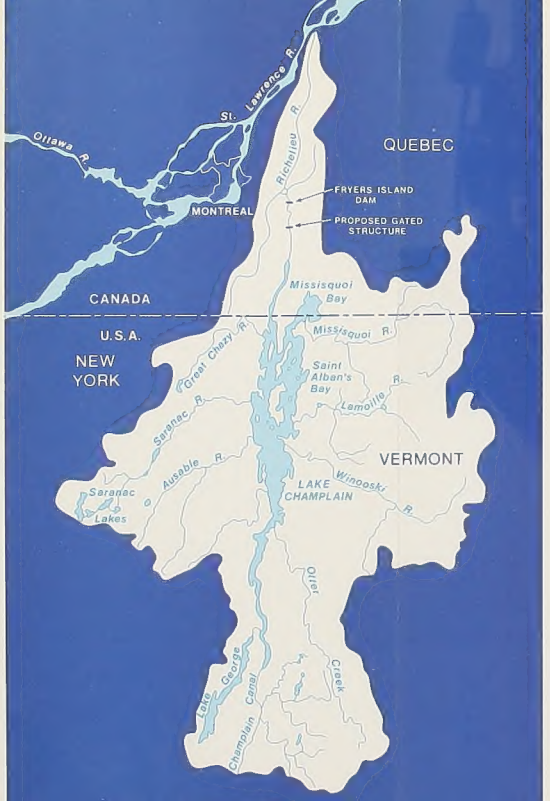
THE PROBLEM

During periods of continuous and heavy precipitation, the water levels of Lake Champlain, responding largely to natural causes, have approached 102 feet. While this is only about three feet higher than normal, serious damage results. On the average, total damages in both countries cost shoreline residents about $4 million per year. More damage takes place in the United States than in Canada.

From an engineering point of view, it is possible to reduce flooding using a combination of structural and non-structural methods. However, there have been differing opinions on how to provide the protection needed and still safeguard the conditions necessary for reproduction and maintenance of the basin's fish, plants and wildlife.

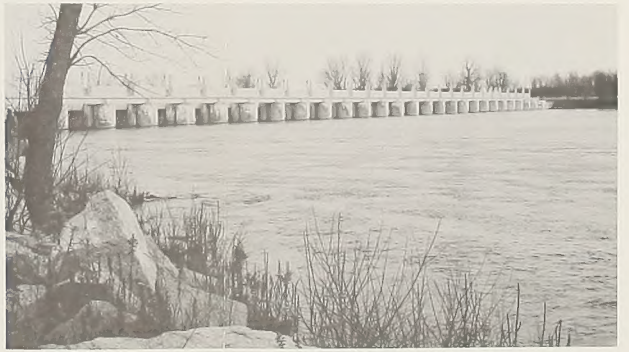
APPROACH TO THE PROBLEM

On the assumption that water levels will have to be artificially regulated, environmental criteria were developed so as to make information available on the elevation, frequency and duration of lake levels that are required to maintain an acceptable lake ecosystem, or even enhance the environmental management of the lake and river. Regulation schemes were then tested to provide the flood protection needed within the terms of these criteria.



Each year, a wide variety of migratory birds use the lake and river as a staging area, and some remain to breed.

Use of Fryers Island Dam was one of the alternatives in the investigation.



In all, three structural and several non-structural alternatives were selected for detailed study to reduce flood damage. After evaluation of these alternatives as independent solutions, the economic feasibility of a combined plan incorporating both structural and non-structural elements evolved.

ENVIRONMENTAL CRITERIA

In brief, the criteria would permit occasional flooding up to elevation 100 feet and regulate the rate of decline of water levels when the Northern Pike are spawning early in the spring. The criteria would also ensure satisfactory wetland conditions for vegetation, waterfowl and wildlife during the late summer and winter. A minimum discharge in the Richelieu River would be maintained to ensure the well-being of the river during the low flow period in the fall.

PRIOR ACTION

In 1937, a project was authorized which, if completed, should have reduced flood levels by about three feet. As part of this project, Fryers Island Dam was built spanning the Richelieu River about 6 miles downstream of St-Jean. Today, the dam is still in place and operable, but the portion of the project dealing with channel dredging and dyking along the river was not carried out. Completion of this work was considered as one of the alternatives in the Commission's investigations but this solution was eventually discarded when it was realized that it would violate the environmental criteria.

THE RECOMMENDED PLAN

On applying the environmental criteria to the regulation plans using the various alternative structural schemes, a new gated structure near St-Jean was determined to be the best alternative for reducing flood damages and meeting the environmental requirements. In addition to the structure, the plan calls for excavation of 320,000 cubic yards of material from the river bed, inauguration of flood forecasting and warning, and restriction of future development of the flood plain. This combination could reduce annual flood damage by about $3 million or 70 per cent.